1

SEQUENCE LISTING

<110> DUFF, GORDON W.
COX, ANGELA
CAMP, NICOLA J.
DIGIOVINE, FRANCESCO S.

<120> DIAGNOSTICS AND THERAPEUTICS FOR DISEASES ASSOCIATED
WITH AN IL-1 INFLAMMATORY HAPLOTYPE

<130> MSA-010.03

<140> 09/845,129
<141> 2001-4-27

<150> PCT/GB98/01481
<151> 1998-05-21

<150> 9711040.7
<151> 1997-05-29

<160> 32

<170> PatentIn Ver. 2.0

<210> 1
<211> 11970
<212> DNA
<213> Homo sapiens

<400> 1
```
aagcttctac cctagtctgg tgctacactt acattgctta catccaagtg tggttatttc 60
tgtggctcct gttataacta ttatagcacc aggtctatga ccaggagaat tagactggca 120
ttaaatcaga ataagagatt ttgcacctgc aatagacctt atgacaccta accaacccca 180
ttatttacaa ttaaacagga acagagggaa tactttatcc aactcacaca agctgttttc 240
ctcccagatc catgcttttt tgcgttatt attttttaga gatgggggct tcactatgtt 300
gcccacactg gactaaaact ctgggcctca agtgattgtc ctgcctcagc ctcctgaata 360
gctgggacta caggggcatg ccatcacacc tagttcattt cctctattta aaatatacat 420
ggcttaaact ccaactggga acccaaaaca ttcatttgct aagagtctgg tgttctacca 480
cctgaactag gctggccaca ggaattataa aagctgagaa attctttaat aatagtaacc 540
aggcaacatc attgaaggct catatgtaaa aatccatgcc ttcctttctc ccaatctcca 600
ttcccaaact tagccactgg ttctggctga ggccttacgc atacctcccg gggcttgcac 660
acaccttctt ctacagaaga cacaccttgg gcatatccta cagaagacca ggcttctctc 720
tggtccttgg tagagggcta ctttactgta acagggccag ggtggagagt tctctcctga 780
agctccatcc cctctatagg aaatgtgttg acaatattca gaagagtaag aggatcaaga 840
cttctttgtg ctcaaatacc actgttctct tctctaccct gccctaacca ggagcttgtc 900
accccaaact ctgaggtgat ttatgcctta atcaagcaaa cttccctctt cagaaaagat 960
ggctcatttt ccctcaaaag ttgccaggag ctgccaagta ttctgccaat tcaccctgga 1020
gcacaatcaa caaattcagc cagaacacaa ctacagctac tattagaact attattatta 1080
ataaattcct ctccaaatct agccccttga cttcggattt cacgatttct cccttcctcc 1140
tagaaacttg ataagtttcc cgcgcttccc tttttctaag actacatgtt tgtcatctta 1200
taaagcaaag gggtgaataa atgaaccaaa tcaataactt ctggaatatc tgcaaacaac 1260
aataatatca gctatgccat ctttcactat tttagccagt atcgagttga atgaacatag 1320
aaaaatacaa aactgaattc ttccctgtaa attccccgtt ttgacgacgc acttgtagcc 1380
acgtagccac gcctacttaa gacaattaca aaaggcgaag aagactgact caggcttaag 1440
ctgccagcca gagagggagt catttcattg gcgtttgagt cagcaaaggt attgtcctca 1500
catctctggc tattaaagta ttttctgttg ttgttttttct ctttggctgt tttctctcac 1560
attgccttct ctaaagctac agtctctcct ttcttttctt gtccctccct ggtttggtat 1620
```

```
gtgacctaga attacagtca gatttcagaa aatgattctc tcattttgct gataaggact 1680
gattcgtttt actgagggac ggcagaacta gtttcctatg agggcatggg tgaatacaac 1740
tgaggcttct catgggaggg aatctctact atccaaaatt attaggagaa aattgaaaat 1800
ttccaactct gtctctctct tacctctgtg taaggcaaat accttattct tgtggtgttt 1860
ttgtaacctc ttcaaacttt cattgattga atgcctgttc tggcaataca ttaggttggg 1920
cacataagga ataccaacat aaataaaaca ttctaaaaga agtttacgat ctaataaagg 1980
agacaggtac atagcaaact aattcaaagg agctagaaga tggagaaaat gctgaatgtg 2040
gactaagtca ttcaacaaag ttttcaggaa gcacaaagag gaggggctcc cctcacagat 2100
atctggatta gaggctggct gagctgatgg tggctggtgt tctctgttgc agaagtcaag 2160
atggccaaag ttccagacat gtttgaagac ctgaagaact gttacaggta aggaataaga 2220
tttatctctt gtgatttaat gagggtttca aggctcacca gaatccagct aggcataaca 2280
gtggccagca tgggggcagg ccggcagagg ttgtagagat gtgtactagt cctgaagtca 2340
gagcaggttc agagaagacc cagaaaaact aagcattcag catgttaaac tgagattaca 2400
ttggcaggga gaccgccatt ttagaaaaat tattttttgag gtctgctgag ccctacatga 2460
atatcagcat caacttagac acagcctctg ttgagatcac atgccctgat ataagaatgg 2520
gttttactgg tccattctca ggaaaacttg atctcattca ggaacaggaa atggctccac 2580
agcaagctgg gcatgtgaac tcacatatgc aggcaaatct cactcagatg tagaagaaag 2640
gtaaatgaac acaaagataa aattacggaa catattaaac taacatgatg tttccattat 2700
ctgtagtaaa tactaacaca aactaggctg tcaaaatttt gcctggatat tttactaagt 2760
ataaattatg aaatctgttt tagtgaatac atgaaagtaa tgtgtaacat ataatctatt 2820
tggttaaaat aaaaaggaag tgcttcaaaa cctttctttt ctctaaagga gcttaacatt 2880
cttccctgaa cttcaattaa agctcttcaa tttgttagcc aagtccaatt tttacagata 2940
aagcacaggt aaagctcaaa gcctgtcttg atgactacta attccagatt agtaagatat 3000
gaattactct acctatgtgt atgtgtagaa gtccttaaat ttcaaagatg acagtaatgg 3060
ccatgtgtat gtgtgtgacc cacaactatc atggtcatta aagtacattg gccagagacc 3120
acatgaaata acaacaatta cattctcatc atcttatttt gacagtgaaa atgaagaaga 3180
cagttcctcc attgatcatc tgtctctgaa tcaggtaagc aaatgactgt aattctcatg 3240
ggactgctat tcttacacag tggtttcttc atccaaagag aacagcaatg acttgaatct 3300
taaatacttt tgttttaccc tcactagaga tccagagacc tgtctttcat tataagtgag 3360
accagctgcc tctctaaact aatagttgat gtgcattggc ttctcccaga acagagcaga 3420
actatcccaa atccctgaga actggagtct cctggggcag gcttcatcag gatgttagtt 3480
atgccatcct gagaaagccc cgcaggccgc ttcaccaggt gtctgtctcc taacgtgatg 3540
tgttgtggtt gtcttctctg acaccagcat cagaggttag agaaagtctc caaacatgaa 3600
gctgagagag aggaagcaag ccagctgaaa gtgagaagtc tacagccact catcaatctg 3660
tgttattgtg tttggagacc acaaatagac actataagta ctgcctagta tgtcttcagt 3720
actggcttta aaagctgtcc ccaaaggagt atttctaaaa tattttgagc attgttaagc 3780
agatttttaa cctcctgaga gggaactaat tggaaagcta ccactcacta caatcattgt 3840
taacctattt agttacaaca tctcattttt gagcatgcaa ataaatgaaa aagtcttcct 3900
aaaaaaatca tctttttatc ctggaaggag gaaggaaggt gagacaaaag ggagagaggg 3960
agggaagcct aatgaaacac cagttaccta agaccagaat ggagatcctc ctcactacct 4020
ctgttgaata cagcacctac tgaaagaact ttcattccct gaccatgaac agcctctcag 4080
cttctgtttt ccttcctcac agaaatcctt ctatcatgta agctatggcc cactccatga 4140
aggctgcatg gatcaatctg tgtctctgag tatctctgaa acctctaaaa catccaagct 4200
taccttcaag gagagcatgg tggtagtagc aaccaacggg aaggttctga agaagagacg 4260
gttgagttta agccaatcca tcactgatga tgacctggag gccatcgcca atgactcaga 4320
ggaaggtaag gggtcaagca caataatatc tttctttttac agttttaagc aagtagggac 4380
agtagaattt aggggaaaat taaacgtgga gtcagaataa caagaagaca accaagcatt 4440
agtctggtaa ctatacagag gaaaattaat ttttatcctt ctccaggagg gagaaatgag 4500
cagtggcctg aatcgagaat acttgctcac agccattatt tcttagccat attgtaaagg 4560
tcgtgtgact tttagccttt caggagaaag cagtaataag accacttacg agctatgttc 4620
ctctcatact aactatgcct ccttggtcat gttacataat cttttcgtga ttcagtttcc 4680
tctactgtaa aatggagata atcagaatcc cccactcatt ggattgttgt aaagattaag 4740
agtctcaggc tttacagact gagctagctg ggccctcctg actgttataa agattaaatg 4800
agtcaacatc ccctaacttc tggactagaa taatgtctgg tacaaagtaa gcacccaata 4860
aatgttagct attactatca ttattattat tatttttatttt ttttttttttg agatggagtc 4920
tggctctgtc acccaggctg gagtgcagtg gcacaatctc ggctcactgc aagctctgcc 4980
tcctgggttc atgccattct cctgcctcag cctcccgagt aagctgggaa tacaggcacc 5040
cgccactgtt cccggctaat tttttgtatt tttagtagag acggagtttc accgtggtct 5100
```

```
ccatctcctc gtgatccacc caccttggcc tcccaaagtg ccgggattac aggcgtgagc 5160
caccgcgccc ggcctattat tattattatt actactacta ctacctatat gaatactacc 5220
agcaatacta atttattaat gactggatta tgtctaaacc tcacaagaat cctaccttct 5280
cattttacat aaaaggaaac taagctcatt gagataggta aactgcccaa tggcatacat 5340
ctgtaagtgg gagagcctca aatctaattc agttctacct gagtaaaaaa atccatggtt 5400
ctcctccatc cctttactgt acaagcctcc acatgaacta taaacccaat attcctgttt 5460
ttaagataat acctaagcaa taacgcatgt tcacctagaa ggttttaaaa tgtaacaaaa 5520
tataagaaaa taaaaatcac tcatatcgtc agtgagagtt tactactgcc agcactatgg 5580
tatgtttcct taaaatcttt gctatacaca tacctacatg tgaacaaata tgtctaacat 5640
caagaccaca ctatttacaa ctttatatcc agcttttctt acttagcaat gtattgagga 5700
cattttagag tgcccgtttt tcaccattat aagcaatgca acaatgaaca tctgtataaa 5760
taaatattca tttctctcac cctttatttc cttagaatat attcctagaa gtagaatttc 5820
ccagagccat gaggatttgt gacgctattg atatgtgcca ctttgcactc tctgtgacat 5880
atataattat ttttaatgca ttcatttttt tctcagagtg cattcgtttg aaaacataga 5940
cgggaaatac tggtagtctt ccttgtcagt tagaaacacc caaacaatga aaaatgaaaa 6000
agttgcacaa atagtctcta aaaacaatga aactattgcc tgaggaattg aagtttaaaa 6060
agaagcacat aagcaacaac aaggataatc ctagaaaacc agttctgctg actgggtgat 6120
ttcacttctc tttgcttcct catctggatt ggaatattcc taataccccc tccagaacta 6180
tttttccctgt ttgtactaga ctgtgtatat catctgtgtt tgtacataga cattaatctg 6240
cacttgtgat catggtttta gaaatcatca agcctaggtc atcacctttt agcttcctga 6300
gcaatgtgaa atacaacttt atgaggatca tcaaatacga attcatcctg aatgacgccc 6360
tcaatcaaag tataattcga gccaatgatc agtacctcac ggctgctgca ttacataatc 6420
tggatgaagc aggtacatta aaatggcacc agacatttct gtcatcctcc cctcctttca 6480
tttacttatt tatttatttc aatctttctg cttgcaaaaa acatacctct tcagagttct 6540
gggttgcaca attcttccag aatagcttga agcacagcac ccccataaaa atcccaagcc 6600
agggcagaag gttcaactaa atctggaagt tccacaagag agaagtttcc tatctttgag 6660
agtaaagggt tgtgcacaaa gctagctgat gtactacctc tttggttctt tcagacattc 6720
ttaccctcaa ttttaaaact gaggaaactg tcagacatat taaatgattt actcagattt 6780
acccagaagc caatgaagaa caatcactct cctttaaaaa gtctgttgat caaactcaca 6840
agtaacacca aaccaggaag atctttatta tctctgataa catatttgtg aggcaaaacc 6900
tccaataagc tacaaatatg gcttaaagga tgaagtttag tgtccaaaaa cttttatcac 6960
acacatccaa ttttcatggc ggacatgttt tagtttcaac agtatacata ttttcaaagg 7020
tccagagagg caattttgca ataaacaagc aagactttt ctgattggat gcacttcagc 7080
taacatgctt tcaactctac atttacaaat tattttgtgt tctattttc tacttaatat 7140
tatttctgca attttcccaa tattgacatc gtgtatgtat ttgccatttt taatatcact 7200
agacaattca atcaggttgc tacgttggtc ccttgggttt actctaaata gcttgattgc 7260
aaatatcttt gtatatatta ttgttttttc tcctatcttg taatttcttt gagcacatcc 7320
caaagaggaa tgcctagatc aatgggcaca aataatttga cagctcttat taaacattat 7380
tctgtaagta aaaactgaac tactttcag tatcactagc aacatatgag tgtatcagct 7440
tcctaaaccc ctccatgtta ggtcattatg aacttatgat ctaacaaatt acagggtctt 7500
atcccactaa tgaaattata agagattcaa cacttattca gccccgaagg attcattcaa 7560
cgtagaaaat tctaagaaca ttaaccaagt atttacctgc ctagtgagtg tggaagacat 7620
tgtgaaggac acaaagatgt atagaattcc attcctgact tccaggtatt tacaccatag 7680
gtggggacct aactacacac acacacacac acacacacac acacacacac accatgcaca 7740
cacaatctac atcaacactt gatttttatac aaatacaatg aatttacttt cttttttggtt 7800
cttctcttca ccagtgaaat ttgacatggg tgcttataag tcatcaaagg atgatgctaa 7860
aattaccgtg attctaagaa tctcaaaaac tcaattgtat gtgactgccc aagatgaaga 7920
ccaaccagtg ctgctgaagg tcagttgtcc tttgtctcca acttaccttc atttacatct 7980
catatgtttg taaataagcc caataggcag acacctctaa caaggtgaca ctgtcctctt 8040
tccttcctac cacagccccc acctacccac cccactccca ttgattccag aggcgtgcct 8100
aggcaggatc tatgagaaaa tataacagag agtaagagga aaattacctt ctttcttttt 8160
cctttccctg cctgacctta ttcacctccc atcccagagc atccatttat tccattgatc 8220
tttactgaca tctattatct gacctacaca atactagaca ttaggacaat gtggctgcc 8280
tccaagaaac tcaaataagc caactgagat cagagaggat taatcacctg ccaatgggca 8340
caaagcaaca agctgggagc caagtcccaa aatggggcct gctgcttcca gttccctct 8400
ctctgcattg atgtcagcat tatccttcgt cccagtcctg tctccactac cactttcccc 8460
ctcaaacaca cacacacaca acagccttag atgttttctc cactgataag taggtgactc 8520
aatttgtaag tatataatcc aagaccttct attcccaagt agaatttatg tgcctgcctg 8580
```

```
tgcttttcta cctggatcaa gtgatgtcta cagagtaggg cagtagcttc attcatgaac  8640
tcattcaaca agcattattc actgagagcc ttgtattttt caggcatagt gccaacagca  8700
gtgtggacag tggtgcatca aagcctctag tctcatagaa cttagtcttc tggaggatat  8760
ggaaaacaga caacccaaac aaccaacaaa agagcaagat gctgcaaaaa aaaaaaaaat  8820
gaatagggtg ctaagataga gaaaagtggg agagtgctat ttagacaaag tggtaaaaac  8880
aaagcccctt gtgagatgag agctgccgac agaggggggcg ggtcatggtt gtgggttttt  8940
gggtaggaca ttcagaggag ggggcgggtc gtggttgtgg gttttttgggt aggacattca  9000
gaggaggggg cgggtcgtgg ttgtgggttt ttgggtagga cattcagagg aggggcgggg  9060
tcgtggttgt gggttttttgg gtaggacatt cagaggaggg ggcgggtcgt ggttgtgggt  9120
ttttgggaca ttcagaggag tctgaatgca cccaggccta caacttcaag atggtaaagg  9180
acagctccaa ggatcagaag aagcattctt ggaactgggg cattttgaga aggaggaaaa  9240
atatgcagag actagtgctt gcagagcttg catttggatt tcatttgagg tacaatgaaa  9300
acccattaat gggtttcaca cagtgcaatg gcctgacctc acttatattt cctaaaatag  9360
aaaacagatc agaaggaagg caatagagaa gcagaaagtc caatgaggag gtttcacagc  9420
agtcatgggg gtggggtaag gaaaagaagt ggaaagaaac agacagaatt gggttatatt  9480
ttggagatag aaccaacaga aggaagagga gaaacaacat ttactgagaa gggaaaaagt  9540
aggagaggaa taggtttggg aaataaatcc tgctgacatt ggaaaccccca aggaagcctc  9600
aaaagtatat ttacttgctt tagatttaaa agaataggaa agaagcatct caacttggaa  9660
tttgaaatct atttttccat aaaagtattg ttaaattcta ctcatactca caagaaaagt  9720
acattctaaa gagtatattg aaagagttta ctgatatact taggaatttt gtgtgtatgt  9780
gtgtgtgtgt atgtgtgtgt gtgtgtttaa ccttcaattg ttgacttaaa tactgagata  9840
aatgtcatct aaatgctaaa ttgatttccc aaaggtatga tttgttcact tggagatcaa  9900
aatgtttagg gggcttagaa tcactgtagt gctcagattt gatgcaaaat gtcttaggcc  9960
tatgttgaag gcaggacaga aacaatgttt ccctcctacc tgcctggata cagtaagata  10020
ctagtgtcac tgacaatctt cataactaat ttagatctct ctccaatcaa ctaaggaaat  10080
caactcttat taatagactg ggccacacat ctactaggca tgtaataaat gcttgctgaa  10140
tgaacaaatg aatgaagagc ctatagcatc atgttacagc catagtccta aagtggtgtt  10200
tctcatgaag gccaaatgct aagggattga gcttcagtcc tttttctaac atcttgttct  10260
ctaacagaat tctcttcttt tcttcatagg agatgcctga gatacccaaa accatcacag  10320
gtagtgagac caacctcctc ttcttctggg aaactcacgg cactaagaac tatttcacat  10380
cagttcccca tccaaacttg tttattgcca caaagcaaga ctactgggtg tgcttggcag  10440
gggggccacc ctctatcact gactttcaga tactggaaaa ccaggcgtag gtctggagtc  10500
tcacttgtct cacttgtgca gtgttgacag ttcatatgta ccatgtacat gaagaagcta  10560
aatcctttac tgttagtcat ttgctgagca tgtactgagc cttgtaattc taaatgaatg  10620
tttacactct ttgtaagagt ggaaccaaca ctaacatata atgttgttat ttaaagaaca  10680
ccctatattt tgcatagtac caatcatttt aattattatt cttcataaca attttaggag  10740
gaccagagct actgactatg gctaccaaaa agactctacc catattacag atgggcaaat  10800
taaggcataa gaaaactaag aaatatgcac aatagcagtt gaaacaagaa gccacagacc  10860
taggatttca tgatttcatt tcaactgttt gccttctgct tttaagttgc tgatgaactc  10920
ttaatcaaat agcataagtt tctgggacct cagttttatc attttcaaaa tggagggaat  10980
aatacctaag ccttcctgcc gcaacagttt tttatgctaa tcagggaggt cattttggta  11040
aaatacttct cgaagccgag cctcaagatg aaggcaaagc acgaaatgtt atttttttaat  11100
tattatttat atatgtattt ataaatatat ttaagataat tataatatac tatatttatg  11160
ggaacccctt catcctctga gtgtgaccag gcatcctcca caatagcaga cagtgttttc  11220
tgggataagt aagtttgatt tcattaatac agggcatttt ggtccaagtt gtgcttatcc  11280
catagccagg aaactctgca ttctagtact tgggagacct gtaatcatat aataaatgta  11340
cattaattac cttgagccag taattggtcc gatctttgac tcttttgcca ttaaacttac  11400
ctgggcattc ttgtttcatt caattccacc tgcaatcaag tcctacaagc taaaattaga  11460
tgaactcaac tttgacaacc atgagaccac tgttatcaaa acttcttttt ctggaatgta  11520
atcaatgttt cttctaggtt ctaaaaattg tgatcagacc ataatgttac attattatca  11580
acaatagtga ttgatagagt gttatcagtc ataactaaat aaagcttgca acaaaattct  11640
ctgacacata gttattcatt gccttaatca ttattttact gcatggtaat tagggacaaa  11700
tggtaaatgt ttacataaat aattgtattt agtgttactt tataaaatca aaccaagatt  11760
ttatattttt ttctcctctt tgttagctgc cagtatgcat aaatggcatt aagaatgata  11820
atatttccgg gttcacttaa agctcatatt acacatacac aaaacatgtg ttcccatctt  11880
tatacaaact cacacataca gagctacatt aaaaacaact aataggccag gcacggtggc  11940
tcagacctgt aatcccagca ctttgggagg                                   11970
```

&lt;210&gt; 2
&lt;211&gt; 9721
&lt;212&gt; DNA
&lt;213&gt; Homo sapiens

&lt;220&gt;
&lt;223&gt; "n" bases throughout the sequence may be A, T, C, G,
      other or unknown

&lt;400&gt; 2

```
agaaagaaag agagagagaa agaaaagaaa gaggaaggaa ggaaggaagg aagaaagaca 60
ggctctgagg aaggtggcag ttcctacaac gggagaacca gtggttaatt tgcaaagtgg 120
atcctgtgga ggcanncaga ggagtcccct aggccaccca gacagggctt ttagctatct 180
gcaggccaga caccaaattt caggagggct cagtgttagg aatggattat ggcttatcaa 240
attcacagga aactaacatg ttgaacagct tttagatttc ctgtggaaaa tataacttac 300
taaagatgga gttcttgtga ctgactcctg atatcaagat actgggagcc aaattaaaaa 360
tcagaaggct gcttggagag caagtccatg aaatgctctt tttcccacag tagaacctat 420
ttccctcgtg tctcaaatac ttgcacagag gctcactccc ttggataatg cagagcgagc 480
acgatacctg gcacatacta atttgaataa aatgctgtca aattcccatt cacccattca 540
agcagcaaac tctatctcac ctgaatgtac atgccaggca ctgtgctaga cttggctcaa 600
aaagatttca gtttcctgga ggaaccagga gggcaaggtt tcaactcagt gctataagaa 660
gtgttacagg ctggacacgg tggctcacgc ctgtaatccc aacatttggg aggccgaggc 720
gggcagatca caaggtcagg agatcgagac catcctggct aacatggtga aaccctgtct 780
ctactaaaaa tacaaaaaat tagccgggcg ttggcggcag gtgcctgtag tcccagctgc 840
tggggaggct gaggcaggag aatggtgtga acccgggagg cggaacttgc aggggggccga 900
gatcgtgcca ctgcactcca gcctgggcga cagagtgaga ctctgtctca aaaaaaaaaa 960
aaaagtgtta tgatgcagac ctgtcaaaga ggcaaaggag ggtgttccta cactccaggc 1020
actgttcata acctggactc tcattcattc tacaaatgga gggctcccct gggcagatcc 1080
ctggagcagg cactttgctg gtgtctcggt taaagagaaa ctgataactc ttggtattac 1140
caagagatag agtctcagat ggatattctt acagaaacaa tattcccact tttcagagtt 1200
caccaaaaaa tcattttagg cagagctcat ctggcattga tctggttcat ccatgagatt 1260
ggctagggta acagcacctg gtcttgcagg gttgtgtgag cttatctcca gggttgcccc 1320
aactccgtca ggagcctgaa ccctgcatac cgtatgttct ctgccccagc caagaaaggt 1380
caattttctc ctcagaggct cctgcaattg acagagagct cccgaggcag agaacagcac 1440
ccaaggtaga gacccacacc ctcaatacag acaggaggg ctattggccc ttcattgtac 1500
ccatttatcc atctgtaagt gggaagattc ctaaacttaa gtacaaagaa gtgaatgaag 1560
aaaagtatgt gcatgtataa atctgtgtgt cttccacttt gtcccacata tactaaattt 1620
aaacattctt ctaacgtggg aaaatccagt attttaatgt ggacatcaac tgcacaacga 1680
ttgtcaggaa aacaatgcat atttgcatgg tgatacattt gcaaatgtg tcatagtttg 1740
ctactccttg cccttccatg aaccagagaa ttatctcagt ttattagtcc cctcccctaa 1800
gaagcttcca ccaatactct tttcccctt cctttaactt gattgtgaaa tcaggtattc 1860
aacagagaaa tttctcagcc tcctacttct gcttttgaaa gctataaaaa cagcgaggga 1920
gaaactggca gataccaaac ctcttcgagg cacaaggcac aacaggctgc tctgggattc 1980
tcttcagcca atcttcattg ctcaagtatg actttaatct tccttacaac taggtgctaa 2040
gggagtctct ctgtctctct gcctctttgt gtgtatgcat attctctctc tctctctctt 2100
tctttctctg tctctcctct ccttcctctc tgcctcctct ctcagctttt tgcaaaaatg 2160
ccaggtgtaa tataatgctt atgactcggg aaatattctg ggaatggata ctgcttatct 2220
aacagctgac accctaaagg ttagtgtcaa agcctctgct ccagctctcc tagccaatac 2280
attgctagtt ggggtttggt ttagcaaatg cttttctcta gacccaaagg acttctcttt 2340
cacacattca ttcatttact cagagatcat ttctttgcat gactgccatg cactggatgc 2400
tgagagaaat cacacatgaa cgtagccgtc atggggaagt cactcatttt ctccttttta 2460
cacaggtgtc tgaagcagcc atggcagaag tacctgagct cgccagtgaa atgatggctt 2520
attacaggtc agtggagacg ctgagaccag taacatgagc aggtctcctc tttcaagagt 2580
agagtgttat ctgtgcttgg agaccagatt tttcccctaa attgcctctt tcagtggcaa 2640
acagggtgcc aagtaaatct gatttaaaga ctactttccc attacaagtc cctccagcct 2700
tgggacctgg aggctatcca gatgtgttgt tgcaagggct tcctgcagag gcaaatgggg 2760
agaaaagatt ccaagcccac aatacaagga atccctttgc aaagtgtggc ttggagggag 2820
agggagagct cagattttag ctgactctgc tgggctagag gttaggcctc aagatccaac 2880
```

```
agggagcacc agggtgccca cctgccaggc ctagaatctg ccttctggac tgttctgcgc 2940
atatcactgt gaaacttgcc aggtgtttca ggcagctttg agaggcaggc tgtttgcagt 3000
ttcttatgaa cagtcaagtc ttgtacacag ggaaggaaaa ataaacctgt ttagaagaca 3060
taattgagac atgtccctgt ttttattaca gtggcaatga ggatgacttg ttctttgaag 3120
ctgatggccc taaacagatg aaggtaagac tatgggttta actcccaacc caaggaaggg 3180
ctctaacaca gggaaagctc aaagaaggga gttctgggcc actttgatgc catggtattt 3240
tgttttagaa agactttaac ctcttccagt gagacacagg ctgcaccact tgctgacctg 3300
gccacttggt catcatatca ccacagtcac tcactaacgt tggtggtggt ggccacactt 3360
ggtggtgaca ggggaggagt agtgataatg ttcccatttc atagtaggaa gacaaccaag 3420
tcttcaacat aaatttgatt atccttttaa gagatggatt cagcctatgc caatcacttg 3480
agttaaactc tgaaaccaag agatgatctt gagaactaac atatgtctac ccctttgag 3540
tagaatagtt ttttgctacc tggggtgaag cttataacaa caagacatag atgatataaa 3600
caaaaagatg aattgagact tgaaagaaaa ccattcactt gctgtttgac cttgacaagt 3660
cattttaccc gctttggacc tcatctgaaa aataaagggc tgagctggat gatctctgag 3720
attccagcat cctgcaacct ccagttctga aatatttttca gttgtagcta agggcatttg 3780
ggcagcaaat ggtcattttt cagactcatc cttacaaaga gccatgttat attcctgctg 3840
tcccttctgt tttatatgat gctcagtagc cttcctaggt gcccagccat cagcctagct 3900
aggtcagttg tgcaggttgg aggcagccac ttttctctgg ctttatttta ttccagtttg 3960
tgatagcctc ccctagcctc ataatccagt cctcaatctt gttaaaaaca tatttcttta 4020
gaagttttaa gactggcata acttcttggc tgcagctgtg ggaggagccc attggcttgt 4080
ctgcctggcc tttgcccccc attgcctctt ccagcagctt ggctctgctc caggcaggaa 4140
attctctcct gctcaacttt cttttgtgca cttacaggtc tctttaactg tctttcaagc 4200
ctttgaacca ttatcagcct taaggcaacc tcagtgaagc cttaatacgg agcttctctg 4260
aataagagga aagtggtaac atttcacaaa aagtactctc acaggatttg cagaatgcct 4320
atgagacagt gttatgaaaa aggaaaaaaa agaacagtgt agaaaaattg aatacttgct 4380
gagtgagcat aggtgaatgg aaaatgttat ggtcatctgc atgaaaaagc aaatcatagt 4440
gtgacagcat tagggataca aaaagatata gagaaggtat acatgtatgg tgtaggtggg 4500
gcatgtacaa aaagatgaca agtagaatcg ggatttattc taaagaatag cctgtaaggt 4560
gtccagaagc cacattctag tcttgagtct gcctctacct gctgtgtgcc cttgagtaca 4620
cccttaacct ccttgagctt cagagaggga taatcttttt attttatttt attttatttt 4680
gtttttgtttt gttttgtttt gtttttatgag acagagtctc actctgttgc ccaggctgga 4740
gtgcagtggt acaatcttgg cttactgcat cctccacctc ctgagttcaa gcgattctcc 4800
ttcctcagtc tcctgaatag ctaggattac aggtgcaccc caccacaccc agctaatttt 4860
tgtattttta gtagagaagg ggtttcgcca tgttggccag ctggttttg aagtcctgac 4920
ctaaatgatt catccacctc ggcttcccaa agtgctggga ttacaggcat gagccaccac 4980
gcctggccca gagagggatg atctttagaa gctcgggatt cttttcaagcc ctttcctcct 5040
ctctgagctt tctactctct gatgtcaaag catggttcct ggcaggacca cctcaccagg 5100
ctccctccct cgctctctcc gcagtgctcc ttccaggacc tggacctctg ccctctggat 5160
ggcggcatcc agctacgaat ctccgaccac cactacagca agggcttcag gcaggccgcg 5220
tcagttgttg tggccatgga caagctgagg aagatgctgg ttccctgccc acagaccttc 5280
caggagaatg acctgagcac cttctttccc ttcatctttg aagaaggtag ttagccaaga 5340
gcaggcagta gatctccact tgtgtcctct tggaagtcat caagccccag ccaactcaat 5400
tcccccagag ccaaagccct ttaaaggtag aaggcccagc ggggagacaa aacaaagaag 5460
gctggaaacc aaagcaatca tctctttagt ggaaactatt cttaaagaag atcttgatgg 5520
ctactgacat ttgcaactcc ctcactcttt ctcaggggcc tttcacttac attgtcacca 5580
gaggttcgta acctccctgt gggctagtgt tatgaccatc accattttac ctaagtagct 5640
ctgttgctcg gccacagtga gcagtaatag acctgaagct ggaacccatg tctaatagtg 5700
tcaggtccag tgttcttagc caccccactc ccagcttcat ccctactggt gttgtcatca 5760
gactttgacc gtatatgctc aggtgtcctc caagaaatca aattttgcca cctcgcctca 5820
cgaggcctgc ccttctgatt ttatacctaa acaacatgtg ctccacattt cagaacctat 5880
cttcttcgac acatgggata acgaggctta tgtgcacgat gcacctgtac gatcactgaa 5940
ctgcacgctc cgggactcac agcaaaaaag cttggtgatg tctggtccat atgaactgaa 6000
agctctccac ctccagggac aggatatgga gcaacaaggt aaatggaaac atcctggttt 6060
ccctgcctgg cctcctggca gcttgctaat tctccatgtt ttaaacaaag tagaaagtta 6120
atttaaggca aatgatcaac acaagtgaaa aaaaatatta aaaggaata tacaaacttt 6180
ggtcctagaa atggcacatt tgattgcact ggccagtgca tttgttaaca ggagtgtgac 6240
cctgagaaat tagacggctc aagcactccc aggaccatgt ccacccaagt ctcttgggca 6300
tagtgcagtg tcaattcttc cacaatatgg ggtcatttga tggacatggc ctaactgcct 6360
```

```
gtgggttctc tcttcctgtt gttgaggctg aaacaagagt gctggagcga taatgtgtcc 6420
atccccctcc ccagtcttcc cccccttgccc caacatccgt cccacccaat gccaggtggt 6480
tccttgtagg gaaattttac cgcccagcag gaacttatat ctctccgctg taacgggcaa 6540
aagtttcaag tgcggtgaac ccatcattag ctgtggtgat ctgcctggca tcgtgccaca 6600
gtagccaaag cctctgcaca ggagtgtggg caactaaggc tgctgacttt gaaggacagc 6660
ctcactcagg gggaagctat ttgctctcag ccaggccaag aaaatcctgt ttctttggaa 6720
tcgggtagta agagtgatcc cagggcctcc aattgacact gctgtgactg aggaagatca 6780
aaatgagtgt ctctctttgg agccactttc ccagctcagc ctctcctctc ccagtttctt 6840
cccatgggct actctctgtt cctgaaacag ttctggtgcc tgatttctgg cagaagtaca 6900
gcttcacctc tttcctttcc ttccacattg atcaagttgt tccgctcctg tggatgggca 6960
cattgccagc cagtgacaca atggcttcct tccttccttc cttcagcatt taaaatgtag 7020
accctctttc attctccgtt cctactgcta tgaggctctg agaaaccctc aggcctttga 7080
ggggaaaccc taaatcaaca aaatgaccct gctattgtct gtgagaagtc aagttatcct 7140
gtgtcttagg ccaaggaacc tcactgtggg ttcccacaga ggctaccaat tacatgtatc 7200
ctactctcgg ggctaggggt tggggtgacc ctgcatgctg tgtccctaac cacaagaccc 7260
ccttctttct tcagtggtgt tctccatgtc ctttgtacaa ggagaagaaa gtaatgacaa 7320
aataccgtg gccttgggcc tcaaggaaaa gaatctgtac ctgtcctgcg tgttgaaaga 7380
tgataagccc actctacagc tggaggtaag tgaatgctat ggaatgaagc ccttctcagc 7440
ctcctgctac cacttattcc cagacaattc accttctccc cgcccccatc cctaggaaaa 7500
gctgggaaca ggtctatttg acaagttttg cattaatgta aataaattta acataatttt 7560
taactgcgtg caaccttcaa tcctgctgca gaaaattaaa tcattttgcc gatgttatta 7620
tgtcctacca tagttacaac cccaacagat tatatattgt tagggctgct ctcatttgat 7680
agacaccttg ggaaatagat gacttaaagg gtcccattat cacgtccact ccactcccaa 7740
aatcaccacc actatcacct ccagctttct cagcaaaagc ttcatttcca agttgatgtc 7800
attctaggac cataaggaaa aatacaataa aaagcccctg gaaactaggt acttcaagaa 7860
gctctagctt aattttcacc cccccaaaaa aaaaaaattc tcacctacat tatgctcctc 7920
agcatttggc actaagtttt agaaaagaag aagggctctt ttaataatca cacagaaagt 7980
tgggggccca gttacaactc aggagtctgg ctcctgatca tgtgacctgc tcgtcagttt 8040
cctttctggc caacccaaag aacatctttc ccataggcat ctttgtccct tgccccacaa 8100
aaattcttct ttctctttcg ctgcagagtg tagatcccaa aaattaccca aagaagaaga 8160
tggaaaagcg atttgtcttc aacaagatag aaatcaataa caagctggaa tttgagtctg 8220
cccagttccc caactggtac atcagcacct ctcaagcaga aaacatgccc gtcttcctgg 8280
gagggaccaa aggcggccag gatataactg acttcaccat gcaatttgtg tcttcctaaa 8340
gagagctgta cccagagagt cctgtgctga atgtggactc aatccctagg gctggcagaa 8400
agggaacaga aaggttttg agtacggcta tagcctggac tttcctgttg tctacaccaa 8460
tgcccaactg cctgccttag ggtagtgcta agaggatctc ctgtccatca gccaggacag 8520
tcagctctct cctttcaggg ccaatcccca gcccttttgt tgagccaggc ctctctcacc 8580
tctcctactc acttaaagcc cgcctgacag aaaccacggc cacatttggt tctaagaaac 8640
cctctgtcat tcgctcccac attctgatga gcaaccgctt ccctatttat ttatttattt 8700
gtttgtttgt tttgattcat tggtctaatt tattcaaagg gggcaagaag tagcagtgtc 8760
tgtaaaagag cctagttttt aatagctatg gaatcaattc aatttggact ggtgtgctct 8820
ctttaaatca agtcctttaa ttaagactga aaatatataa gctcagatta tttaaatggg 8880
aatatttata aatgagcaaa tatcatactg ttcaatggtt ctgaaataaa cttcactgaa 8940
gaaaaaaaa aaagggtctc tcctgatcat tgactgtctg gattgacact gacagtaagc 9000
aaacaggctg tgagagttct tgggactaag cccactcctc attgctgagt gctgcaagta 9060
cctagaaata tccttggcca ccgaagacta tcctcctcac ccatcccctt tatttcgttg 9120
ttcaacagaa ggatattcag tgcacatctg gaacaggatc agctgaagca ctgcagggag 9180
tcaggactgg tagtaacagc taccatgatt tatctatcaa tgcaccaaac atctgttgag 9240
caagcgctat gtactaggag ctgggagtac agagatgaga acagtcacaa gtccctcctc 9300
agataggaga ggcagctagt tataagcaga acaaggtaac atgacaagta gagtaagata 9360
gaagaacgaa gaggagtagc caggaaggag ggaggagaac gacataagaa tcaagcctaa 9420
agggataaac agaagatttc cacacatggg ctgggccaat tgggtgtcgg ttacgcctgt 9480
aatcccagca ctttgggtgg cagggcaga aagatcgctt gagcccagga gttcaagacc 9540
agcctgggca acatagtgag actcccatct ctacaaaaaa taaataaata aataaaacaa 9600
tcagccaggc atgctggcat gcacctgtag tcctagctac ttgggaagct gacactggag 9660
gattgcttga gcccagaagt tcaagactgc agtgagctta tccgttgacc tgcaggtcga 9720
c                                                                  9721
```

<210> 3
<211> 12565
<212> DNA
<213> Homo sapiens

<400> 3

```
gtcgacctgc aggtcaacgg atctgagagg agagtagctt cttgtagata acagttggat 60
tatataccat gtcctgatcc ccttcatcat ccaggagagc agaggtggtc accctgatag 120
cagcaagcct gggggctgca gcttggtggg tagaggtact caggggtaca gatgtctcca 180
aacctgtcct gctgccttag ggagcttcta ataagttgat ggatttggtt aaaattaact 240
tggctacttg gcaggactgg gtcagtgagg accaacaaaa agaagacatc agattatacc 300
ctggggggttt gtatttcttg tgtttctttc tcttctttgt actaaaatat ttacccatga 360
ctgggaaaga gcaactggag tctttgtagc attatcttag caaaaattta caaagtttgg 420
aaaacaatat tgcccatatt gtgtggtgtg tcctgtgaca ctcaggattc aagtgttggc 480
cgaagccact aaatgtgaga tgaagccatt acaaggcagt gtgcacatct gtccacccaa 540
gctggatgcc aacatttcac aaatagtgct tgcgtgacac aaatgcagtt ccaggaggcc 600
caaatgaaaa tgtttgtact gaaatttgtt aaagcttccc gacaaactag atttatcagt 660
aaggattgtt ttctgcaagg gggatgaaac ttgtggggtg agccatttgg gctgaggagg 720
agggaggttg gagctgagaa atgtggagac aatttccctt tagaaggact gaatctccct 780
gcctctctgg ggtgcggcag ccagcaggat ccaatggtgt atatgtctcc ccagctcccc 840
attcagtgat atcatgtcag tagcttgaaa ttatccgtgg tgggagtatt atgtcatgga 900
aattggcaaa tggaaacttt tattggagat tcaattgtta aacttttacc agcacaacac 960
tgccctgcct tcagagtcaa tgaccctatc caagtttaat ccatctgtcc actgtctcca 1020
acacgatctt tataaaacac acctgacaac attacccttt tattcagttt tttaaaagat 1080
aagtttccag ctcatcgggg tggctttaaa ggccatttct cctctggacc tcacccaact 1140
tttcaaatca cttttcctac ccctacctct aaatgctact caaactccag ccatcctgaa 1200
taataagact tttgaaaagt agattatggg ctgggcacag tggctcacac ctgtaatccc 1260
agcactttgg gaggccaaga tgggtggatc acctgaggtc gggagttcga gaccagcctg 1320
actaacatag tgaaaccctg tctctactaa aaatacaaaa ttagttgggg gtggtggcac 1380
aagcctgtaa tcccagctac tcaggaggtt gaggcagggg aattgcttga acctgggagg 1440
cggaggttgc ggtgagccta gattgctcca ctgcactcca gcctgggcaa caagagcgaa 1500
actccatctc aaaaaaataa ataaataaat aaagtagatt acatcagata cctctggcct 1560
aggttgttta tgaccaactc tcctgctgag aataactaga aaagctagac aaaacatatt 1620
tccaaaagat ctctttggag gcatcagaga atggccaagg ctgtaaggaa ctgcctgagc 1680
ccagagaggt ggagcccagc actggtgccc tttactcctg gggacatgtg ctggtttcaa 1740
aaacttcagc tgagcttttg agcattcatg gaacttggtg ggggagatga aatttgtacc 1800
ttaaatcctg cctacaggga gggtccctga taatccccac ccaatttgga aatctgggtc 1860
agccttcaca ggtactgaag ccctcctctg aatgatctca agtcctgcta gggtagaggt 1920
tacctgcttt tgaaaggctc ctggcctacc tgtgcagcag gagcaaaagt gaaccatctc 1980
agggtacaga taacaatcat ccagagcctt gaatgacctc tactgtgctt aatatatagt 2040
attcagcagt cagtaaaaag gatttaggca catgcaagat gacctgtgta tcagggagaa 2100
ataggcaata aattgagatc cagcagggat ttgaatcatg gatttgaatc aggggcagcc 2160
ttcgaaagaa ctatggagaa tatactcaga tttaaaacat aagattggaa tttttggcag 2220
agaactaaca actgtacaaa aaaggaacca aatggaaatc ctagaactga aagatgcaat 2280
taaccgatgt tgagaaatag ccaacatcta ttgaacactt cccatgtgga cagctgtgct 2340
aaacacttta caggcatcaa cataagatgt gtccccttac agcagtgcag tgtccctcct 2400
aagacatgga cagcctggtt tccctatctc tctgcttcat caaaaccccct ttacgtgggg 2460
cttagacact cctgttgtct ctagtgtcta gtagcacagg gctcagcaca tggaagccac 2520
tagatacaat ttgatgacca ggacctccga tgaaagccat gggtgctgat tgggaaggca 2580
ttgtctttta tgtgctatgg tcttaaagct tcatccagga agcagaactc gggggggtgct 2640
gaggacccag aaccgagaat aagattagtc agagatttcc tgtgggcaga aatcataagg 2700
acgccaactg tttgggtgag ataagacgaa accaagagtg gacttgtggc cagaagcgtg 2760
aggaagaggg agagagcttc ccttgtcccc tttcttcctc tccctaagcc acagtgattg 2820
acagcccccc cgctttggag tcagagcagg cttgagactg gactgggaaa ggagggtggg 2880
tcaggataca gagcaggaag gctgggagtg caggcagga gcaagggct ggggcattca 2940
ttgtgcctga tctctcccac tttacctggg gtaaagaagc atatgcaaaa gccacggtgt 3000
gagtatttcc caagtgccag ggtcagggca tgattcatca cgtgcagcat ttcattcaat 3060
ccttatagta accgatgatg tggcttctat tattagctct atcagataat gaaactgaga 3120
```

```
ccaagacagg ctctgcacat tgtgtggggt aatgacacag ggggattcag acctagactc 3180
cataactcct gccccaggga ccacccccac cctcaccctg tgcatgtcga caaaggacag 3240
actgggccac ttctcaggac acagcgggga aatgacacag agcagggagg ttccaggagc 3300
cccgagcgtc ttttctccag gagaatactc tctgaattca gactggggtc agagaaacat 3360
ttacccagga gccgcagtgt gggtggggct ttttacttga aacgctgtct gaaggcagtg 3420
gcaggatgaa ctctccaccc taccttggca agccacttct cttctgcaat ctgtaaggac 3480
attgttgaga gaattatggt cttccaattc cggagggttg aagaaagaca aataggagag 3540
aacctatcat agtcaggtgc tagctgcctt ctctttcaga gagtgtgaga ataaagtgat 3600
acacttgatt attagcaaat actttggaaa ttttaaacgc taatattcaa cacactctgg 3660
aagaggcaaa taagtagaca ggttcatata catcatctcc ttcagctagt cctcacaaaa 3720
acaaacaaat gaataaacaa aattcttctt tggccctcat aggaagacac tgtttcttga 3780
acgtgtttca aaaaggatgg gtgactcact caaggtcaca ctgttatga ggacagtaca 3840
ggaatacaga catgccattt tgcctgaaaa aatccatcac ccaggaggt gacacaattt 3900
tgcagaaatg ttctatttcc tctgaaggat acattcttta aacctttggg aaattcattc 3960
atagtcttcc tcctttgaag gattactctc tggacacaaa gtgtttgatt ctgatttgtt 4020
ggttggaaga tgtgttggtt gagagaaaga ttctgatttg ttggttgaaa atagactcat 4080
caagatcaac tgctgtagta gtaaatattt tgacattttg tctgtattcc tgtgctgccc 4140
tcacaagctg catcaccttg agtgagtcat tcatactttt ttgtttgttt ttgtttttgga 4200
gatggagtct tactctgttg cctaggctgg agtgcggtgg cgtgatcttg gctcactgcg 4260
acctccatct cctgggttca agtgatcctc ctgcctcagc ctcccgagta gctgggatta 4320
caggcacatg ccaccatccc tgctaatttt tgcattttca gtagagacgg agtttcacca 4380
tgttggtcag gttggtcttg aactcctgac ctcaggtgat ccgcccacct cagcctcccc 4440
aagtgctggg attacaggtg tgagccaccg tgcccagccc agccatcatt tttgaaacac 4500
gtttgagaaa tagtgtcttc ctttgagggc caaggagaca ttttttttgt ttatttgttt 4560
gtttttgtga ggactagctg aaggggtga tgtatattaa cctgcctact tatttgcctc 4620
ttcccagagt gtgatgaata ttagggttta aagtttctga agcatttgtt aataaagccc 4680
ggggctggag gtcagaagac ctggatttct ctgcatactt ttgccatcag caagctgtgt 4740
gaccttggac agatcccttt tttgtctaaa tctttctgag tcttcttgaa aacaatgcca 4800
ggttgggaca ggatgattgc caagctcccg tccagctcta aaacactgca acgtatgctt 4860
ctgcaccagc actgtccatc ctgtagatca tgcagaaatt ctcttcaact ttttcctacc 4920
cataaaatag gagcatgctt accttttttcc taatgttcca ggccccgggt ctagatattg 4980
taagtaagga agttaatgtg tatcagagcc cattatgggc cagaagttct cctcttcctt 5040
cctacacctg cttcctccct ccctccctcc ctctttccct tccttccttc catccatttg 5100
tgaagaagac atgatcaccc tcattctgag agtgaagaga cagaggctca actaatgaaa 5160
tgatttgttc aaggtcacac gggtggcaca aggcaagtgg cagaggttga atttagaccc 5220
attcctgtcc aaatgctgag tttatgtcat cgtcccgaga ccataacttt aaagatgtaa 5280
gatagtggga aaagagttga tttcaaagca cctctcagaa ggactcactt tacatcaggg 5340
gtcagcagac tcaggccaaa tccggtccat tccccgcttt tgcaaagaaa gttgtagtgg 5400
aacacagcta ggcttattga tttatggatt gccaacgtcc ttttgtgaaa cagacagctg 5460
agctgagtaa tcgtggcgca caaaacctaa aatatttact atctcgtcct ttacagaatg 5520
tttgccaatc tatggtccgg agtccaaggc tgtccatttt tcaaagaaca caaagtgaca 5580
tgagactgtc ccatgtgcag ggagccctat cattttatta tgaaaaaacg gcctttctgc 5640
tcaaatctgt tttttaaaaa gtcaacaaac agactctggg tacctgtcag gaacagtagg 5700
gagtttggtt tccattgtgc tcttcttccc aggaactcaa tgaaggggaa atagaaatct 5760
taattttggg gaaattgcac aggggaaaaa ggggagggaa tcagttacaa cactccattg 5820
cgacacttag tggggttgaa agtgacaaca gcaagggttt ctctttttgg aaatgcgagg 5880
agggtatttc cgcttctcgc agtggggcag ggtggcagac gcctagcttg ggtgagtgac 5940
tatttcttta taaaccacaa ctctgggccc gcaatggcag tccactgctt gctgcagtca 6000
cagaatggaa atctgcagag gcctccgcag tcacctaatc actctcctcc tcttcctgtt 6060
ccattcagag acgatctgcc gaccctctgg gagaaaatcc agcaagatgc aagccttcag 6120
gtaaggctac cccaaggagg agaaggtgag ggtggatcag ctggagactg gaaacatatc 6180
acagctgcca gggctgccag gccagagggc ctgagaactg ggtttgggct ggagaggatg 6240
tccattattc aagaaagagg ctgttacatg catgggcttc aggacttgtg tttcaaaata 6300
tcccagatgt ggatagtgcg accggagggc tgtcttactt ccccagagac tcaggaaccc 6360
agtgagtaat agatgcatgc caaggagtgg gactgcgatt caggcctagt tgaatgtgct 6420
gacagagaag cagagagggg caccaggggc acagcccgaa ggcccagact gatatgggca 6480
aggcctgtct gtgctgacat gtcggagggt cccactctcc agggaccttg gtttccccgt 6540
ctgtgacatc tgtgacatga gagtcacgat aactccttgt gtgccttaca gggttgttgt 6600
```

```
gaaaattaaa tgcacagata atagcgtaac agtattccgt gcattgtaaa gagcctgaaa 6660
accattatga tttgaaaatg gaatcggctt tgtgagacca tcactattgt aaagatgtga 6720
tgctgataga aatgacagga ctgcttgtgc atgccctctg cagtgtgaca ttccagcagt 6780
gaaatcatgt tggggtgact tctcccccac tctgaccttt atgtttgtct gggccgaggc 6840
tgcaagtcgg gctctgtggg tgtatgagtg acaagtctct cccttccaga tatggggact 6900
gtctgcttcc ctaggttgcc tctccctgct ctgatcagct agaagctcca ggagatcctc 6960
ctggaggccc cagcaggtga tgtttatccc tccagactga ggctaaatct agaaactagg 7020
ataatcacaa acaggccaat gctgccatat gcaaagcact ttggtttgcc tggccacccc 7080
tcgtcgagca tgtgggctct tcagagcacc tgatgaggtg ggtacagtta gccacacttc 7140
acaggtgaag aggtgaggca caggtcccag gtcaggctgg ccggagctct gtttattacg 7200
tctcacagct ttgagtcctg ctctcaacca gagaggccct ttaccaagaa gaaaggattg 7260
ggacccagaa tcaggtcact ggctgaggta gagaggaagc cgggttgttc ccaagggtag 7320
ctgctcctgc aggactctga gcaggtcacc agctaatgga ggaaaggctc tagggaaaga 7380
cccttctggt ctcagactca gagcgagtta gctgcaaggt gttccgtctc ttgaaacttc 7440
tacctaggtg ctatggtagc cactagtctc aggtggctat ttaaatttat acttaaatga 7500
atgaaaatag aagaaaattt aaaatccaga cccttggtca cactatccac atttaaagag 7560
gtcaatagcc acatgtggtt agtggccacc ctattgggca gtgcagctac agaacatttt 7620
tgcatcccag aaagttcttt tggatgttgc tgctctacag catgctttgc tgaaacagaa 7680
gtgccttccc tgggaatctc agatgggaag caagtaagga ggggagtcaa atgtgggctc 7740
actgctcacc agctgtgagg gttgggcctg cctcttaacc attgtcagcc tcagtcttct 7800
catccatgca tgccgtgggt atactaaaat actatacccc tggaagagct ggatgcaaat 7860
ttgacaagtt ctgggggaca caggaaggtg ccaagcacaa ggctgggcac atggtggctg 7920
tgcactacag ctgagtcctt ttccttttca gaatctggga tgttaaccag aagaccttct 7980
atctgaggaa caaccaacta gttgctggat acttgcaagg accaaatgtc aatttagaag 8040
gtgagtggtt gccaggaaag ccaatgtatc tgggcatcac gtcactttgc ccgtctgtct 8100
gcagcagcat ggcctgcctg cacaaaccct aggtgcaatg tcctaatcct tgttgggtct 8160
ttgtattcaa gtttgaagct gggagggcct ggctactgaa gggcacatat gagggtagcc 8220
tgaagagggt gtggagaggt agagtctagg tcagaggtca gtgcctatag gcaagtggtc 8280
ccagggccac agctgggaag ggcaaatacc agaaggcaag gttgaccatt cccttcctca 8340
agtgcctatt aaggctccat gttcctatgt tgttcaaacc ctaactcaat cccaaattaa 8400
tccaccatgt ataaggttga gctatgtctc ttattcctgg acaccatact cagccatatc 8460
tggtccacac attaacagct ggatgacctt gaagaagctt cacccactct gttcctcagc 8520
tttcccttca gtgggatgat atcaactgga caacaggatg tgcgattctt ttagttccag 8580
ccttccagga tgttttcact cccctgtttg ttgttgtagg atggtattac ctccaccttc 8640
ccaccttccc tatgccctgg ttctgtctcc tgtgcctcgc tctgaaagtg gatgagacct 8700
acaattcctg tcctggtagt tctcctaatg aacacactga agcacgagga agctgagatt 8760
tttgttgcta catgagagca tggaggcctc ttagggagag aggaggttca gagactccta 8820
ggctcctggt ggagccccac tcatggcctt gttcattttc cctgcccctc agcaacactc 8880
ctattgacct ggagcacagg tatcctgggg aaagtgaggg aaatatggac atcacatgga 8940
acaacatcca ggagactcag gcctctagga gtaactgggt agtgtgcatc ctggggaaag 9000
tgagggaaat atggacatca catggaacaa catccaggag actcaggcct ctaggagtaa 9060
ctgggtagtg tgcatcctgg ggaaagtgag ggaaatatgg acatcacatg gaacaacatc 9120
caggagactc aggcctctag gagtaactgg gtagtgtgca tcctggggaa agtgagggaa 9180
atatggacat cacatggaac aacatccagg agactcaggc tctaggagt aactgggtag 9240
tgtgcttggt ttaatcttct atttacctgc agaccaggaa gatgagacct ctctgccctt 9300
ctgacctcgg gattttagtt ttgtggggac caggggagat agaaaaatac ccggggtctc 9360
ttcattattg ctgcttcctc ttctattaac ctgaccctcc cctctgttct tccccagaaa 9420
agatagatgt ggtacccatt gagcctcatg ctctgttctt gggaatccat ggagggaaga 9480
tgtgcctgtc ctgtgtcaag tctggtgatg agaccagact ccagctggag gtaaaaacat 9540
gctttggatc tcaaatcacc ccaaaaccca gtggcttgaa acaaccaaaa ttttttctta 9600
tgattctgtg ggttgaccag gattagctgg gtagttctgt tccatgtggt ggaacatgct 9660
ggggtcactt tggaagctgc attcagcaga gtgccaggct tgcgctgggc atccaaggtg 9720
gtccctcatc ctccaggctc tctttccatg tgatctctca gtgtttaaga gttagttgga 9780
gcttccttac agcatggcgg ctgacttcca aaagggatta ttccaaaaag agcctcaaca 9840
tgcaggcgct tattatgact tctgcttgca tcatcctatt ggccaaagcc agtcacgtgg 9900
ctaagtctag ccccctgtga gaggagactg cataagagtg tgaacaccag gagacacggt 9960
cactgggggc caccactgta accatctacc acaggacctg aatctctgtg tgctactccc 10020
ttgctcaagg gccccctac ccacgcagac ctgctgtctt ctagcaaagc ccatcctcag 10080
```

```
gacctttctc ttccaatcct tattgactca aattgattag ttggtgctcc acccagagcc 10140
ctgtgctcct ttatctcatg taatgttaat gggtttccca gccctgggaa aacatggctt 10200
tgtctcaggg gcttgctgga tgcaacctta acctcaatgt gagtggccat actgtggcac 10260
tgtcccatcc ctcaccaggg acactgttct ggagggtgac tgcctgttct gtgaggagtg 10320
gggatggcta ggacattgca tggaacacac caccacccca tcttctcaga gctcaaaccc 10380
tgacagaaca ccagctccac aggccttggc ttctgctgat ggtgccgtgt atttaccaga 10440
cttagtggtc caaggccaga gtggcagatt tcccaaagtc aaggtgtgac agtgggacag 10500
cctctttgtg tctttgctgt cctaagaaac ctgggccagg ccaggcgcag tggctcacgc 10560
cttgtaatcc cagcactttg agaggccaag gtgggcagat cacgaggtca ggagtttgag 10620
accagcctgg ccaacattgg tgaaaccctg tctctattaa aaatagaaaa cattagacag 10680
gtgtggtggt gcatgcctgt aatcccagct actcaggagg ctgaggcagg agaatcgctt 10740
gaacccagga ggtggaggtt gcagtgagcc gagattgtgc cactgcactc cagcctaggc 10800
gacagagcaa gactccgtct cgggaaaatt aattaataaa taaataaacc taggtcccag 10860
agtcccacag aatggcagac aggagcacct gggggctttt agggtatggc atttcccctg 10920
tactaactct gggctgtcca gaggcgattt catggcgtgg agtggagagg gaggcagcac 10980
aggacttcct aggcctcagc tctcacctgc ccatctttg atttccaggc agttaacatc 11040
actgacctga gcgagaacag aaagcaggac aagcgcttcg ccttcatccg ctcagacagt 11100
ggccccacca ccagttttga gtctgccgcc tgccccggtt ggttcctctg cacagcgatg 11160
gaagctgacc agcccgtcag cctcaccaat atgcctgacg aaggcgtcat ggtcaccaaa 11220
ttctacttcc aggaggacga gtagtactgc ccaggcctgc ctgttcccat tcttgcatgg 11280
caaggactgc agggactgcc agtcccccctg ccccagggct cccggctatg ggggcactga 11340
ggaccagcca ttgaggggtg daccctcaga aggcgtcaca acaacctggt cacaggactc 11400
tgcctcctct tcaactgacc agcctccatg ctgcctccag aatggtcttt ctaatgtgtg 11460
aatcagagca cagcagcccc tgcacaaagc ccttccatgt cgcctctgca ttcaggatca 11520
aaccccgacc acctgcccaa cctgctctcc tcttgccact gcctcttcct ccctcattcc 11580
accttccat gccctggatc catcaggcca cttgatgacc cccaaccaag tggctcccac 11640
accctgtttt acaaaaaaga aagaccagt ccatgaggga ggttttaag ggtttgtgga 11700
aaatgaaaat taggatttca tgatttttt tttcagtcc ccgtgaagga gagcccttca 11760
tttggagatt atgttctttc ggggagaggc tgaggactta aaatattcct gcatttgtga 11820
aatgatggtg aaagtaagtg gtagctttc ccttctttt cttctttt tgtgatgtcc 11880
caacttgtaa aaattaaaag ttatggtact atgttagccc cataattttt ttttcctttt 11940
taaaacactt ccataatctg gactcctctg tccaggcact gctgcccagc ctccaagctc 12000
catctccact ccagattttt tacagctgcc tgcagtactt tacctcctat cagaagtttc 12060
tcagctccca aggctctgag caaatgtggc tcctggggt tctttcttcc tctgctgaag 12120
gaataaattg ctccttgaca ttgtagagct tctggcactt ggagacttgt atgaaagatg 12180
gctgtgcctc tgcctgtctc cccaccaggc tgggagctct gcagagcagg aaacatgact 12240
cgtatatgtc tcaggtccct gcagggccaa gcacctagcc tcgctcttgg caggtactca 12300
gcgaatgaat gctgtatatg ttgggtgcaa agttccctac ttcctgtgac ttcagctctg 12360
ttttacaata aaatcttgaa aatgcctata ttgttgacta tgtccttggc cttgacaggc 12420
tttgggtata gagtgctgag gaaactgaaa gaccaatgtg tyttycttac cccagaggct 12480
ggcgcctggc ctcttctctg agagttcttt tcttccttca gcctcactct ccctggataa 12540
                                                                    12565
catgagagca aatctctctg cgggg
```

<210> 4
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 4
tgtacctaag cccacccttt agagc                                          25

<210> 5
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 5
tggcctccag aaacctccaa                                       20

<210> 6
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 6
gctgatattc tggtgggaaa                                       20

<210> 7
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 7
ggcaagagca aaactctgtc                                       20

<210> 8
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 8
atgtatagaa ttccattcct g                                     21

<210> 9
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 9
taaaatcaag tgttgatgta g                                     21

<210> 10
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

```
<400> 10
gggatacagg cgtgagccac cgcg                                    24


<210> 11
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 11
ttagtattgc tggtagtatt catat                                  25


<210> 12
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 12
tgttctacca cctgaactag g                                      21


<210> 13
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 13
ttacatatga gccttccatg                                        20


<210> 14
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 14
ctcaggtgtc ctcgaagaaa tcaaa                                  25


<210> 15
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 15
gctttmgctg tgagtcccg                                         19
```

```
<210> 16
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 16
tggcattgat ctggttcatc                                          20

<210> 17
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 17
gtttaggaat cttcccactt                                          20

<210> 18
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 18
gaggcgtgag aatctcaaga                                          20

<210> 19
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 19
gtgtcctcaa gtggatctgg                                          20

<210> 20
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 20
gggcaacaga gcaatgtttc t                                        21

<210> 21
<211> 20
```

```
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 21
cagtgtgtca gtgtactgtt                                    20


<210> 22
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 22
ctcagcaaca ctcctat                                       17


<210> 23
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 23
tcctggtctg caggtaa                                       17


<210> 24
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 24
ttacgcagat aagaaccagt ttgg                               24


<210> 25
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 25
tttcctggac gcttgctcac ca                                 22


<210> 26
<211> 29
<212> DNA
<213> Artificial Sequence
```

```
<220>
<223> Description of Artificial Sequence: primer

<400> 26                                                              29
ttctatctga ggaacaacca actagtagc

<210> 27
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 27                                                              29
caccagactt gacacaggac aggcacatc

<210> 28
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 28                                                              27
cgaccctctg ggagaaaatc cagcaag

<210> 29
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 29                                                              20
acacaggaag gtgccaagca

<210> 30
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 30                                                              20
tgcagacaga cgggcaaagt

<210> 31
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer
```

<400> 31
ttgtggggac caggggagat                                                    20

<210> 32
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 32
agcctggcac tctgctgaat                                                    20